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ABSTRACT

The focus of this article is whether pure literature can contribute to education. As part of the study of modern literature in Swedish upper secondary school, novels about the future were examined, especially some that take a critical position toward modern civilization. In an experiment using the Perspective Text Analysis approach of B. Bierschenk and I. Bierschenk (1993), a master text was chosen that had shown the theoretically rooted dimensionality of "futurism" as a socially valid concept. Students (18 year olds) were given the task of writing about a novel using concepts from the master text, focusing on "public morality" for the analysis. The hypothesis tested was that a novel writer contributed to the edification of the public only if he or she translates some structural dimension in an ongoing process of civilization. To this translation is attached the sense of public morality. The three novels studied were "Brave New World" by Aldous Huxley (1932), "En levande sjal" ("A Living Soul") by P. C. Jersild (1980), and "The Handmaid's Tale" by Margaret Atwood (1985). The study found that when the students' responses were matched against the master structure, only one of the three novels, Huxley's "Brave New World," met the criterion of being educational with respect to futurism. It contributes to education by mediating an ideology behind a civilization process with a sense of morality. (Contains 18 references.) (SLD)

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Inger Bierschenk

2000 **No. 75**

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Abstract

The focus of this article is on the question whether pure literature can contribute to education. As a portion of modern literature study in Swedish upper secondary level, novels about the future were examined, especially some, which take a critical position toward modern civilisation. In an experiment using Perspective Text Analysis, a master text has shown the theoretically rooted dimensionality of 'futurism' as a socially valid concept. 18 year-olds got the task to write about a novel by using concepts taken from the master structure, of which 'public morality' was selected for the analysis. The hypothesis tested was that a novel writer contributes to the edification of a public only if he/she translates some structural dimension in an ongoing civilisation process. To this translation belongs a sense of public morality. The study concludes that when the students' responses were matched against the master structure, only one novel meets the criterion of being educative with respect to futurism. It is Huxley's "Brave New World", which contributes to education by mediating an ideology behind a civilisation process with a sense of morality.

Science as Subject for Education

When Jean Jacques Rousseau was confronted with the question: "Has the progress of arts and sciences contributed to the edification of our moral values?" he answered it by an emphatic no. He argued for the refinement to which the pure nature alone contributes and thus against the degeneration of the senses and morals, which will be the inevitable consequence of civilisation. This kind of idealistic and utopian debater has always existed, but it seems to take up a great deal of space in times of unrest. Such a period was the Age of Enlightenment. The upheaval was caused by the technical and mercantile revolution in Europe, whose ideas Rousseau contrasted against the human and democratic values. Today, more than two centuries later, the technical development has reached a level, which the contemporaries of Rousseau could not even imagine, and in some sense I think Rousseau was right: Mankind has not been refined. Why should it?

From time to time, the humanities have been in great repute. A main argument in favour of humanistic studies has been the import of reading the classic texts in order to keep up with high ideals. However, there is no evidence that whether classic nor scientific and technical education per se would foster maturity and humanism. Many of us may testify that the conditions at the academic institutions are not more human than at other work places. Maybe the grounding philosophy of today has become directed solely toward training and instruction but not toward education.

The concept of education in the classical sense has shown up in the debate again, in particular as a consequence of the crisis of the instruction of science in school. To get young people interested in the edification of natural science and technology, various measures has been taken. In the first place, efforts have been made to increase the recruitment to industry and high technology research. Later on, the focus has been broadened and now the discussion concerns natural science as educating subject. In addition, ideas on democratic co-operation and the role of science in everyday culture is put forward (e.g. in the steering documents for natural science training at the Swedish upper secondary level). Behind this lies the idea that people cannot be collaborating in the democratic processes without knowledge of natural science in everyday life. To this view also belongs the opinion that natural science is itself producing culture (Sjøberg, 1999).

The overall question of interest to the society is: Why are young people developing negative attitudes toward science and technology and positive ones toward more quasi-scientific alternatives like occultism and new age? There is further a focus on the low proportion of girls within science studies, something that worries both local school politicians and university governors (as seen from a Scandinavian front).

The reason for profiling classic education is the idea that the humanities will enrich the science and technology subjects in school (and possibly also the idea that these values would attract girls to a higher extent). Of course there is much to the fact that natural science and technology alone do not suffice as a basis for judging matters of energy, environmental care and city planning, for instance. With a cultural and democratic perspective put into the curriculum, the science subjects would get a new status as educating subjects. So far the lower secondary school has been unsuccessful in giving the students a reasonable all-round education in science and technology, according to chemistry professor Sven Engström (1999).

The answer to the question about young peoples' choice may be found in the scientific conduct toward the environment, which especially the natural sciences have

to maintain. The scholarly manner concerns among other things, autonomy, objectivity, systematic observations and the demand for empirical evidence. To that must be added a secularised attitude toward reality, free from myths. Against this mode of thinking often a set of opposites are put forward, which will introduce a holistic, humanistic view of reality, which may even be called unscientific for the sake of the good name. Certain natural scientists with a gentle appearance are acting as lures, as for example a female technologist at the Institute of Science and Technology at Lund, Sweden, who is invited to TV programs to talk about physics for girls. When Nobel price holder Ilya Prigogine talks about the important stimulation between disciplines of science and humanities for the understanding of the world, he will be cited (Katz, 1996). But nobody would ever think of these persons in terms of unscientific behaviour vis-à-vis their academic subjects. The feminine outlook and gentle appearance is attracting students, because it is supposed that the scientist and the private person are identical. The ideal personality is not the cool and rational observer at least in the eyes of female students, seems to be the policy. But if we could get researchers appear amiable and like people in common, then natural science will loose its unpleasant image. However, reality is more differentiated than that, because when the young people have started their natural science program, they will discover that strictness, objectivity and systematic observation are required of them. And when they have stayed in the program for a while, they may be able to keep apart the person from the subject, especially since they will meet a large number of female teachers in science and technology.

Education as Matter of Democracy

The scientific conception of the world has changed man's world picture and his own place in it. The history of science therefore is closely connected with the material, philosophical and artistic development. The ideals of natural science are close to the democratic, e.g. the respect of arguments and evidence. Autonomy, objectivity and rationality are central to both science and democracy (Sjøberg, 1999 p 17). These concepts are often put in relation to the concept of education. To be able to talk about education as a result of training in natural science subjects integrated with the humanities, we have to be careful in selecting the humanistic aspects. The classical texts are reflecting the educational – or ideational – development. In this sense an educated person is one who can take part in the open discussion of a society with reason and sentiment.

Since it is the pure literature that forms the basis of the humanities, it is this literature that is the starting-point of the integration efforts. But we have to keep in mind that the pure literature in many respects is an artistic expression and as such it has no scientific pretensions. Even though the modernists claimed to transform the new findings in literary form, the way e.g. the theories of Freud and Einstein has taken form in Durrell's "The Alexandria Quartet" (Håkansson, 1999), this transformation can only be a personally held formation. It may be very skilful and contribute to the perspectivation of humans and their world. But it may be myth creating as well and in this case it contributes rather to the picture of single human beings than of their world, which forms a reliability problem.

Over and above the personal features of the artistic design it is incontestably so, at least in the Swedish pure literature of today, that the political residence of the author is permeating the work. This fact will be a dilemma from a democratic point of view, especially because this residence is being exploited so one-sidedly and is so dominating in our textbooks. As opposed to the natural scientists the authors of pure

literature and fiction do not want to make any difference between their person and their work but instead they seem to mean that they are deeply involved. It becomes really problematic when young readers cannot see through the political propaganda. The ideal of humanism is said to be the understanding of the single human beings' dignity (Kjørup, 1999). When thinking about humanism today being put forward in public by "proletarius", who makes human dignity a matter of class, one has to accept that "classicus" should not bother.

In order for humanistic subjects to contribute to education, the study of pure literature should come closer to the scientific conduct. An educated individual should be able to take part in the argumentation processes of democracy (Kalleberg, 1999). It will require ethics in both science and communication by those who are forming our educational history in literature and by those, who are transferring it over to younger generations. Thus the scientific conduct is central to school too. It would for example mean that we study the literary Gestalt formation in such a way that we understand something basic in the text. Not the artistic expression and not the personal standpoints, but what the text expresses when seen as part of our educational history. By this the student gets concrete knowledge but also general insights into e.g. human rights or the complexity in a civilisation process. In this way literature study will be a democratic project. Of utmost importance then will be the selection of representative texts. I will give some examples: The scientifically working authors of the so called naturalistic era toward the late 19th century wrote in both an objective an a subjective manner. Against the background just sketched I would prefer reading "Thérèse Raquin" than "Germinal" (by Zola) in my class, and sooner "Frõken Julie" (Miss Julie) than "Tjänstekvinnans son" (Son of a servant woman) (by Strindberg).

In the tradition from the Age of Enlightenment, society has built up institutions, whose task it is to do research on nature, society, and culture. This task has implied a specialisation, which in turn has called for democracy in the form of "translation" to the public. In this process only educated people can take part. The translation mission rests on the authors of pure literature. The development of knowledge and ideas is steadily changing and the task of the author is to give form to it in a comprehensible way to the public. The scientific way of approaching the task makes the author a modern "classicus". Other approaches may serve other purposes but not the purpose of democratic education, which the representatives of the science subjects wish and intend by the new order. With this outlook, democracy will be connected to education, and also to competence (I. Bierschenk, 1998b). A democratic mind has always been a guarantor for the single person being met in a dignified manner. I do not believe that Rousseau had argued against this thesis. But for sure he would have had difficulties to find some equivalent to the Robinson character in today's literary shipwreck.

Science of Materials in Theory and Practice

Depending on the way the institutions of a society and its citizens maintain the dialogue about the ongoing progress, the social climate is created in which the public life shall grow. One of the modernistic movements of the 20th century is called the "futurism", because it occurred in a time (the First World War) of scientific and industrial progress. As an artistic concept, the futurism implies among other things the cult of various forms of purity and hardness, the machinelike functioning within humans and objects, movement, and a forward look. The artistic design may be read from out of the surface of paintings, illustrations, decorations and similar products.

Also the futurism has produced some classic texts, most of them poems, which may be incorporated into the European cultural heritage (e.g. by Majakovskij, Diktonius, Lundkvist).

In order for this knowledge in our civilisation history to have an educating effect, the concept of futurism must be understood in its social function. When the leaders of a society will embrace the scientific and industrial optimism, these ideas will permeate significant social functions and give rise to a climate or atmosphere. Thus a vital and democratic civil dialogue is required to make both the representatives and the public conscious of which structures are developed by the time and which their consequences are.

In an earlier made study of a subject matter, whose structural relations represent the theoretical concept behaviourism, I have discussed the consequences that this knowledge of materials may have in guiding students into literary paths (I. Bierschenk, 1999b). Having knowledge of behaviourism as scientific idea is, however, not enough for recognising it when transformed into a narrative about society, as for example in the dystopian novel "1984". With reference to the discussion above it may be said that one needs to have a certain amount of education to be able to apprehend the behaviourism in a structural sense.

In the article mentioned above, I put forward the idea that the materials have to be governing, if our purpose is that teaching shall be raising the level of competence. But, surely, this requires knowledge of which structure there is to apprehend in a certain subject matter. In the present study I take my point of departure in a text, which is suitable for the problem just sketched, that is a text representing the futurism in a social sense. This time I would like to know the extent to which some novels would best be characterised as being educating. How well do the writers present this important subject, that is, "translate" it to the public? Can young readers apprehend the basics of futurism as social idea or will it be hidden behind an author's political message?

Context of the Study

One part of the study of language and literature in upper secondary school has consisted in reading some 20th century novels intended to criticise modern civilisation. The work was accounted for in various ways. One of the ways of interest here is the individual writing account. I was interested in the way in which the students would explain "their" novel in case they quite unprepared would be given some words/concepts to base their essay on. Three novels are included in this study, "Brave New World" by Aldous Huxley (1932), "En levande själ" (A Living Soul) by P C Jersild (1980), and "The Handmaid's Tale" by Margaret Atwood (1985). The premise is that these novels are critical fictions, located in a future in which the technological growth has special consequences for the society that man builds.

In an earlier reported study of upper secondary students' literary comprehension (I. Bierschenk, 1997) I have not found any differences between natural science, social science and aesthetics classes. The classes therefore have no significance this time. Two classes (18 year-olds) have participated, one from the natural science program, and one from the business program. The theoretical concepts, to which they were presented, were taken from the text described below.

Selection of Futuristic Text

The selection of test for this study is the result of a careful preparatiön in the form of a study of sources as well as experiments. In connection with a course in

modern literature I prepared a test, which was aimed to measure the comprehension of modern concepts and "isms" (I. Bierschenk, 1997). I refer to, for example, the cultural and literary concepts of expressionism, futurism and surrealism. I went through the textbooks in question and collected concepts and descriptions of ideas about authorship and literary works. By means of a clustering technique (described in the article referred to) the concepts and descriptions were refined in relation to similarity. In this way I created an empirical definition of the ideational sphere of modern literature. However, I went further to more scientific writings, such as handbooks in psychology, to get definitions of concepts like behaviourism, functionalism and magical realism. In this way the meaning of the concepts grew in clarity, as did also their demarcations vis-à-vis each other. By an experiment I carried out as part of my teaching, I could show the social science roots of the concepts and relation to competence development.

The test contains fifteen texts, each one is a description of a modern concept in function. Some of the texts are constructions, some are taken directly from a handbook or the empirical reality, but with a certain modification. The text used here to get at the social structure of futurism belongs to the last category. It may be seen as an utterance, made by a person in a responsible position, which has been translated to the public with the purpose to explain a position taken in a present scientific matter of debate. The text is worded:

The minister of agriculture puts forward the import of genetic modification in solving severe medical problems, but expresses a hesitation vis-à-vis a non-regularised application within agriculture and breeding of domestic animals. The task of politicians, the minister means, is to see, in close collaboration with the scientific community, that rules and regulations are "in pace with the development".

Presentation of the Text Analysis

To analyse the text I have used Perspective Text Analysis, a method for measuring the dynamics in text production. The method is founded on the hypothesis that there exists unity and continuity in a text, which has no direct relation to the way in which the text has been composed on the surface. For the readers who are interested in the main features of the method, such as the underlying theory, I refer to "The Essence of Text" (I. Bierschenk, 1999a). In this article I have listed references to theory, methodological development, and applications. In this connection it is not very meaningful to describe the functioning of the method, whether linguistically or topologically. However, a few words about the topographical presentation would not be out of place (see e.g. Bierschenk & Bierschenk, 1993; Bierschenk, Bierschenk & Helmersson, 1996; B. Bierschenk, 1997).

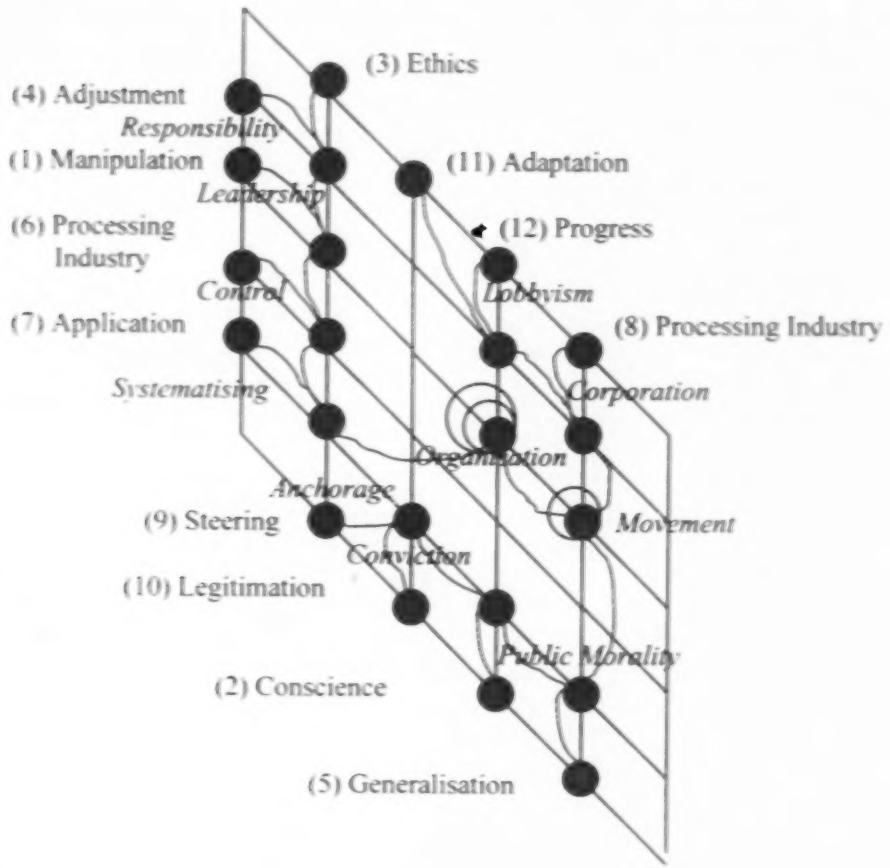
It may be easiest to imagine a spherical, biological organisation, e.g. a snake, which by its rhythmical movements develops the structural coherence of the text. This snake has two parts, the body and the head. To symbolise the smallest possible unity that can be present in a natural text, the logotype of a snake biting itself in the tail is most often used (Spencer-Brown, 1969). In this way a spherical form is generated, which essentially is helical. In Figure 1, Ethics, transformed by Adjustment, represents such a smallest unity. The result of the transformation leads to the first topological invariant, *Responsibility*, which in the figure is depicted as the least possible bodily development. Now, the development of the body and the path of the snake coincide. But the head will move in various directions, which gives the specific

orientation to the path. By the vertical lines we may read out the extent to which the changes of direction are reflecting the deformations of the text. They are termed topological dimensions and are well suited as basis for conceptual comparisons.

In this connection I will not discuss the conceptual structure but instead the dimensionality in the text. We have here four dimensions, which are depicted on the vertical axis. The first dimension is formed by the concepts *Systematising*, *Control*, *Leadership* and *Responsibility*. It seems to represent something that comprises something long-term, which is designed with an overview and under special leading responsibility. Thus I call it ***Social Planning***. This conceptual structure is a matter of a political structure in a broad sense, which is stressed by the second dimension, namely *Anchorage*, denoting that the actual policy or politics should make ***Measures of Acceptance.***

Figure 1.

Futurism in a Social Structure



Note: (1) – (12) = Surface Concepts
In italics = Structural Concepts

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The concepts *Conviction*, *Organisation* and *Lobbyism* form the dimension that denotes the conditions and prerequisites of acceptance making and the way this is channelled. The society can only be formed by the convicted people, who have a central organisation to their disposal to smoothly form a lobby for various purposes. This dimension thus expresses an aspect that concerns ***Influence***. The three dimensions point at the working of a political system. *Public Morality*, *Movement* and *Corporation* together indicate a ***Social Climate*** or atmosphere. A corporate organisation does not always work in public.

According to the way, in which I have discussed the problem, the fourth dimension is the most important one to apprehend in order to say that the citizens have an understanding of the society they live in. I encircled it by picking out the concepts *Public Morality* and *Union* (alternative to *Corporation*). However – as we know – for a synthesis to be formed we need a third point, and thus I selected *Responsibility*, which is the first structural concept formed and therefore may be said to be a connector between the social planners and the resulting spirit. The second and third dimension denote that the citizen is involved as a political co-creator (the structure at the base of the Figure). The question is whether the novel writer is using this dimensionality. It is also evident from the surface concepts where the natural scientists have their input in the process, namely as morality component within the government dimension and as the societal component that may be called strategy of ethical communication (upper entries of the Figure).

I conceive of the public morality, publicly declared or non-declared norms, as the point of the structure, which concerns the single citizen the most. It follows that I take my point of departure in the concept *Public Morality* for this study. By means of the students' descriptive explanation of the novel it will be clear whether the author has an educating effect or whether the emphasis of the novel is within the political dimensions.

Marking Procedure

The marking of an essay task always has to be a matter of an "analysis by synthesis". But compared to other situations, in which the teacher puts together questions to the content or form of a subject, this task is founded on theory. The marking is a matter of relating the responses to the conceptual relations expressed in Figure 1.

The marking procedure was the following: I compared the students' statements with what I judged that they explain of the structure in the Figure. I have tried to treat the responses in an absolute way, that is, they either meet the criterion to be registered under a heading, or they do not meet this criterion. There is an obvious advantage to this procedure, for example when used for grading (I. Bierschenk, 1998a). In some cases I have been helped by the fact that the same concepts as the surface concepts of the Figure has been chosen by the students. This gave a key to the closest structural concept and dimension. But most often I have judged an expression equal to the Figure concepts. In cases where I could not judge any similarity, nothing has been registered.

In the following I give some examples of student responses together with the marking. The first example concerns Huxley's "Brave New World":

"In the brave new world the family, as we know it today, does not exist any longer. Instead humans have chosen to propagate themselves by the 'Dokanovsky method'. As to the upbringing, it means, in the child's first years, nursery rhymes, with which the child is fed. /---/"

From this text I have marked Processing Industry and Manipulation, and because of the last one's placement as surface concept (1) in the structure, the first one has to be considered equal to surface concept (6). Structurally, these sentences are closest equivalent to *Leadership*, that is the first dimension ***Social Planning***.

The next example comes from an explanation of Jersild's "A Living Soul":

"Is it right just because a union of peoples /---/ think it's right? The book's answer to this question according to me is a clear no: One can see clearly how the medical doctor P C Jersild is opposing the modern research in biology and anatomy because of the nearly absence of ethics and responsibility within today's research /---/"

From this text I have registered the deep concept of *Corporation* (union). Therefore I have associated 'the modern research' with Processing Industry as entry (8). In this case the fourth dimension ***Social Climate*** appears. But the student also discusses Social Planning by directly mention ethics (3) and the structural concept *Responsibility*, which was the third concept given.

The third example concerns Atwood's "The Handmaid's Tale":

"By the shift of power one should transit to 'the old values. The actual morality did not permit different attitudes or actions. Even if it was forced on certain persons it should be valid for all, and the rules it implied must be followed. To 'ordinary' people it was in fact so. They were punished mercilessly if they did something prohibited, but this was evidently only a public morality, which was available and real to the public. /---/"

A concept clearly present under the surface is *Control*. Further, *Steering* (9) and rules for the public are mentioned. Once again we have an explanation denoting the dimension of ***Social Planning***. But also the dimension I called ***Measures of Acceptance***. Because, as another student wrote, "many people are suffering in silence because of this realisation – way of reaching the goal". What the students apprehend is the methodical, functional in this society. The method of creating an *Anchorage* needs not be accepted by the citizens, in this case the women.

Each text has been marked in this manner, provided that it has been clear that the response concerned the concept of 'Public Morality' (most frequently denoted by the title). The number of texts possible to mark has been for "Brave New World" (=6), "A Living Soul" (=5) and "The Handmaid's Tale" (=5). The maximum number of texts per book was 6.

Education in Futurism

In Figure 2, I present the dimensionality in the three novels, the way the students have written down their opinions in departing from Public Morality. I indicate the concepts in the structure to which the works have been related. The works are represented by the author's initial (A=Atwood, H=Huxley, J=Jersild). In case a concept is marked by two initials, this means that the first one got more observations.

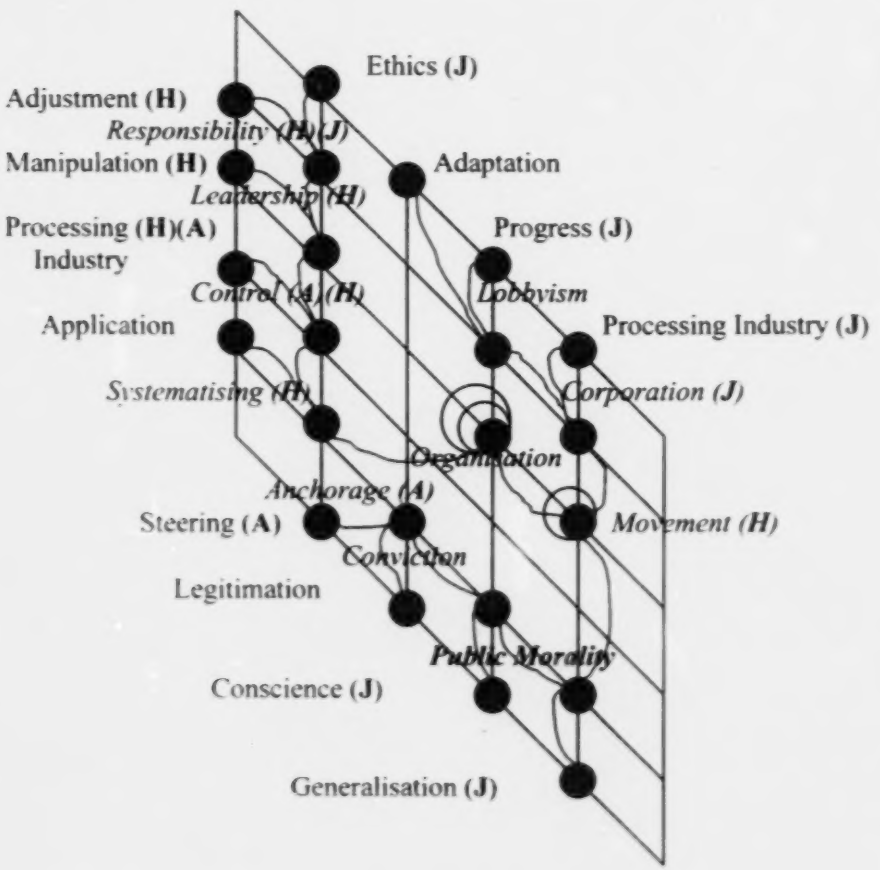
The result shows a very obvious pattern. Huxley's novel is the one, which most significantly describes a public morality by concepts of social planning. Huxley is clearly rooted there, both when it comes to give a picture of the role of natural science in leading a society as well as incorporating a morality component. Concerning Jersild, he contributes in connection with some ethical standpoint, but the responsibility is not quite as valid. Atwood describes a society in its controlling function. According to the students' apprehension, it is not so much a matter of

natural science control but rather the political control of the citizens, in particular the reproductive function of the women. This is also confirmed through Atwood's roots in the dimension which concerns political acceptance, that is a method function, which her novel alone is carrying. Jersild shows an individual pattern in being represented at every surface concept pointing at those dimensions that denote influence and social climate. It seems that he stands for communicational ethics and seeks to represent the conscience of the public. He further seems to be in command of corporativism, possibly due to insider knowledge of medical engineering. Some understanding of society is hardly given by his novel, for it has too few concepts belonging to the first dimension.

The deep concept movement as part of a social climate has only been marked as present in Huxley. This means that only in his novel there are cues to the comprehension of the effects of a civilisation ideology at some deeper level. In Jersild's novel the personal outlooks blur the deeper civilisation problems and Atwood puts forward an horror vision of the methods that does not give enough scientific reliability.

Figure 2.

Futurism in Civilisation Novels



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Discussion

Huxley writes in his preface 15 years later that "Brave New World" is lacking artistic unification but that a book about future can, irrespective of its artistic or philosophical qualities, interest us only if its prophecies seem to probably come true (1967, s 9,). I think it is this view on the writing task, which gives a higher trustworthiness to Huxley's novel, as "translation" of social matters, than to the other two. With this point of departure Huxley's scientific schooling becomes evident, without which the morality problem would not get the same sharpness.

Jersild is placing warning flags and uses humour and satire as his means. But despite the medical laboratory environment the trustworthiness is lacking. The entire story becomes science fiction although without its ambition. Atwood is the one among these authors who has a humanistic schooling. She has further become known as a feminist. Her story is a future vision of our times, the way it would look if our reproduction ability would be strongly reduced. This idea becomes a functionalistic exaggeration, which may be an explanation to the fact that any morality component has not been apprehended.

Education means that some constructive activity takes place. If as a teacher one wishes to mediate some constructive knowledge to students about how thoughts and courses of events in our history of ideas are reflected in society and which their consequences are or might be, literary texts play an obvious role, although not unreservedly. The comparison between the three novels has shown that futurism in a structural sense will best be apprehended through Huxley's story. He makes clear the way in which the natural sciences may be a means to deliberate humanity, for good and evil. There lies the possibility to comprehend the dimensionality or disparity between responsibility and systematising. This is what the movement is sensing. Or, as one of the students, finally, puts it:

"Just think if, as a matter of fact, he isn't critical or moral but is suggesting a solution to a world wide problem?"

A Pretentious Proposal

The quality of teaching at various levels is a matter of controlling the structure characterising a subject matter or material. It is important to distinguish between content, which one can read out from surface features, and structure, which is the inner properties of a material (I. Bierschenk, 1999b). In the same way as in physics we can talk of a material in terms of density, firmness, and tension, similar properties may be attributed to a text material. Therefore, not all texts within a subject area are equally suitable as basis for analysis and synthesis of structural relations.

As we see in Figure 1, a text material may be described by sub structures, which may be more or less nested and cover several dimensions. Futurism as social concept, for example, is in the deepest sense a matter of organisation - in the field of strain between the popular movement and an active political system. A person who does not apprehend the futuristic text (p. 7) as an expression of organisation does not have the insights required for fully accounting for the concept futurism in his/her teaching or examination. The teacher who is in command over the materials thus has the possibility to illustrate the concepts from various angles in a conscious way and make clear to the student the way the structure is interconnected.

My study shows that Huxley's novel better than Atwood's and Jersild's corresponds to the concept futurism in a social sense. If we primarily assume that the author's intention was to construct his material in such a way that the structurally

deep relations will emerge, then he has almost succeeded. The students have apprehended both systematising and movement. A perspective text analysis of the novel would be necessary, however, to elucidate whether the organisation concept is structurally rooted.

The referred result shows what an educational situation should be: A consciousness from the part of the teacher about which structure will be conveyed and a possibility to select the material/s corresponding to it. It is far from sure that educators and educational materials meet each other at the right conceptual level today. My suggestion therefore is that the primary component for the planners of teaching be the science of materials construction for both natural sciences and humanities. With this guiding line education becomes productive.

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